UTC-series UNIVERSAL TRIAXIAL CELL

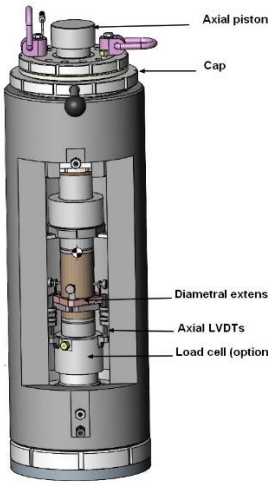
APPLICATIONS

Tests conducted on a series of rock specimens under varying axial stresses, confining pressures, and temperatures enable the measurement and determination of:

- **Axial load:** Force applied to the specimen measured by the load cell
- **Confining pressure (σ_3):** Uniform lateral pressure applied in the triaxial cell
- **Axial stress (σ_1)** : Calculated from axial load and specimen cross-sectional area
- **Deviatoric stress ($\sigma_1 - \sigma_3$) :** Difference between axial stress and confining pressure
- **Axial deformation:** Change in specimen length measured by axial sensors
- **Axial strain (ε_a):** Axial deformation normalized by initial length
- **Radial (diametral) deformation:** Change in diameter measured by diametral sensors
- **Radial strain (ε_r):** Radial deformation normalized by initial diameter
- **Volumetric strain (ε_v)**: Calculated from axial and radial strains
- **Stress–strain curves**: Relationship between stress and strain during loading
- **Young's modulus :** Elastic stiffness derived from the stress–strain curve
- **Poisson's ratio :** Ratio of radial to axial strain in the elastic region
- **Peak strength:** Maximum stress reached before failure
- **Residual strength** : Stress sustained after peak failure

DESCRIPTION

The UTC-series triaxial cell functions as a specialized chamber designed to apply both axial and radial compressive forces on cylindrical rock samples. This dual-directional stress is achieved by exerting a surrounding confining pressure alongside an axial force. To operate, the cell needs to be situated within a specialized axial load frame. Within the cell, the rock sample is encased in a Teflon sleeve and sandwiched between hardened steel end platens.



This setup is then submerged in pressurized oil for confinement. Electrical and coaxial feedthrough connectors at the top of the cell enable the addition of internal measurement instruments, such as devices for tracking axial and radial deformations, ultrasonic platens, and various specialized transducers. Additionally, a heating system can be included in the cell if needed.

TEST PROCEDURE

First, ensure that the rock specimen has a minimum length-to-diameter ratio of 2, and grind its ends flat to achieve parallelism between 0.025 mm and 0.012 mm, depending on the specimen diameter. Next, place the rock sample together with the top and bottom platens into a heat-shrinkable sleeve. Instrument the core sample with diametral and axial deformation sensors, then attach the instrumented specimen to the triaxial cell cap. Insert the assembly into the triaxial cell body, close the cap, and position the cell beneath an appropriate loading frame. Apply a small axial load to secure the setup. Once the desired confining pressure is established, the triaxial test can be performed.

FEATURES

Standard:	ASTM (D2664)
Confining pressure:	Up to 70 / 140 MPa
Specimen diameter:	Up to 55-mm / 100-mm
Specimen length:	Twice the diameter
Wetted part material:	Stainless steel / Inconel

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